MEMORANDUM

TO: DEQ/WQD District Engineers

THROUGH: Larry Robinson, DEQ/WQD, Cheyenne LR

FROM: Jeff Hermansky, DEQ/WQD, Lander Jeff Hermansky

SUBJECT: Polyethylene (PE) Pipe, ANSI/AWWA C906-90
Policies 13.9.12 and 14.14.15

DATE: January 23, 1996

The DEQ/WQD Chapter XII Water Quality Rules and Regulations, The Design and Construction Standards for Public Water Supplies, were adopted May 24, 1985. Since that time, there have been many changes and additions in materials and equipment in the public water supply industry. Among these is the addition of AWWA Standard C906-90 for Polyethylene (PE) pressure Pipe and Fittings, 4 In. through 63 In., for water distribution. This policy statement is an acceptance of AWWA C906-90 as an authorized pipe material for water transmission and distribution systems as well as for pressure sewers. With this acceptance of AWWA C906-90, the January 17, 1986 letter to Donald Armstrong (Policy 14.14.8) denying approval of PE pipe for use as a public water supply transmission line, is hereby rescinded.

The authorization of high density polyethylene (HDPE) pressure pipe and fittings for water transmission, distribution, and pressure sewer is granted with the following conditions:

1. Polyethylene (PE) Pressure Pipe and Fittings, 4 In. through 63 In., for water distribution, must meet all the requirements listed in AWWA C906-90 or the latest revision.

2. All systems must undergo a hydrostatic pressure test at a pressure not exceeding 1.5 times the rated operating pressure of the pipe or lowest rated component in the system. The initial pressure test shall be applied and allowed to stand without makeup pressure for a sufficient time to allow for diametric expansion or pipe stretching to stabilize. This usually occurs within 2-3 hours. After this equilibrium period, the test section can be returned to the 1.5 times operating pressure, the pump turned off and a final test pressure held for 1-3 hours.

   Remember that pressure drop will not only occur due to pressure expansion, but also due to fluctuations in temperature during the test. As the temperature increases, the gauge pressure will decrease. Allowable amounts of makeup water for expansion during the pressure test can be found in Plastic Pipe Institute, PPI Technical Report TR31/9-79. If there are no visual leaks or significant pressure drops during

the final test period, the pipeline passes the test.

The preparations for the pressure test are usually made the afternoon before, the test period run in the morning, and the de-watering with clean-up done after lunch.

Refer to American Society of Mechanical Engineers code for pressure piping B31.8, Appendix N, for a general recommended practice and procedure for hydrostatic testing of HDPE pipe. The pipe manufacturer should be consulted for current written test procedures.

3. Installations must be done in accordance with all the manufacturers recommended procedures. The design engineer must incorporate the necessary procedures into the project specifications.

In addition, the following recommendations and design considerations need to be taken into account:

1. The pressure class required for high density polyethylene (HDPE), PVC, and ductile iron is determined by different AWWA standards. For example, Class 100 PVC is not the same working pressure rating as Class 100 HDPE. Therefore, when determining working pressure rating, consult the AWWA standard appropriate for each material.

2. Bends can be achieved in HDPE pipe by cold sweeping at a minimum radius of 25 times its nominal O.D. size.

3. Permeation - PE is subject to permeation by diesel and gasoline as well as by a number of other chemicals. Despite the absorption of certain chemicals, the pipe still retain's a large measure of its tensile strength and stiffness as evidenced by successful application in crude oil and natural gas gathering lines. In areas where hydrocarbon contamination exists in the ground, special evaluation is warranted for any pipe. For HDPE pressure pipe, it is recommended that an additional 0.5 derating factor be applied to the hydrostatic design stress rating of the pipe when permeation is known to occur. Consult with the pipe manufacturer for specific recommendations for addressing the conditions anticipated.

   In water distribution systems where lines or services may remain relatively stagnant, chemical permeation may result in concentrations of the contaminant above the drinking water MCL. This problem should be compared to permeation potential in other pipe systems where gasket materials may be far more permeable than HDPE. AWWA C906-90 states that "Research has documented that pipe materials such as polyethylene, polybutylene, polyvinyl chloride, and asbestos - cement; and elastomers, such as used in jointing gaskets and packing glands, may be subject to permeation by lower-molecular - weight organic solvents or petroleum products. If a water

pipe must pass through such a contaminated area or an area subject to contamination, consult with pipe manufacturers regarding permeation of pipe walls, jointing materials, and so forth, before selecting material for use in that area."

4. There are many installation requirements for HDPE that differ from either ductile iron or PVC procedures. Is highly recommended that all installations of transmission and distribution system piping be inspected by an engineer or technician familiar with the manufacturers recommended installation practice.

5: HDPE pipe will expand or contract approximately 1.4 inches per 100 feet for each 10 degree F change in temperature. Stresses caused by temperature change are dissipated due to the thermoplastic nature of the material which relaxes and adjusts with time. Direct buried pipe will generally have ample soil friction and interference to restrain movement of the pipe under normal application temperature changes. However, it is a good idea to make the final tie-ins on a system at a temperature which is as close to operating temperature as possible.

JH/jyi